This assignment covers the population dynamics component of the course. Chapter 11 of your textbook provides material that can help you answer the questions in this assignment. You may also need to do additional research, which may not be necessary if the information is in the textbook.

1. a) In order to study populations, scientists need to be able to describe a population. What are THREE different measurements that scientists use to describe populations?

b) Define the terms “population size” and “population density.” How do these two terms differ from one another?

c) An area measuring 1000 ha (1 hectare = 10,000 m²) has 200 wolves in it. What is the size of this population? What is the density of this population?

d) “Small organisms usually have higher population densities than larger organisms”. What are TWO different reasons why you might expect this to be true?
2. a) What is the difference between “crude density” and “ecological density?”

b) Why is this distinction (i.e., crude versus ecological density) necessary? Which of these two measures of density is typically higher?

3. What is meant by the term “population dispersion?”

4. a) Describe what is meant by a “clumped dispersion pattern.” Include a diagram with your description. Provide an example of this type of dispersion pattern from nature.
b) Describe what is meant by a “uniform dispersion pattern.” Include a diagram with your description. Provide an example of this type of dispersion pattern from nature.

c) Describe what is meant by a “random dispersion pattern.” Include a diagram with your description. Provide an example of this type of dispersion pattern from nature.

d) What ultimately determines what type of dispersion pattern a species exhibit in an area?

e) Which type of dispersion pattern is rarest in nature? Why do you think that this is the case?
5) a) Explain what is meant by the term “environment”.

b) Describe some biotic resources that may be limited in an ecosystem at any one time.

c) Describe some abiotic resources that may be limited in an ecosystem at any one time.

6) a) What is meant by the term “carrying capacity of a population”?

b) Is the carrying capacity the same for all species? for all populations of the same species? Discuss.

c) What sorts of things determine the carrying capacity of an ecosystem?

d) In general, what happens to the resources of an ecosystem as a population increases in size?
7) a) Define the term “population dynamics”.

b) What are two means/methods by which a population can increase in size?

c) What are two means/methods by which a population can decrease in size?

d) Define each of the following terms: natality, mortality, emigration, and immigration.

8) a) What is meant by the term “fecundity”?

b) Do all species show the same fecundity? Provide examples of species with a high fecundity. Provide examples of species with a low fecundity.

c) Compare the reproductive strategies of a short-lived species such as a starfish and a long-lived species such as a hippopotamus.
9) What are THREE different patterns in “survivorship” that species exhibit? For each pattern
   a) use a graph/figure to illustrate the pattern,
   b) describe characteristics of species that show that pattern, and
   c) provide an example of a species that exhibits that pattern

10) How does the number of offspring that are produced by an individual typically compare with the fecundity of that individual? What sorts of factors create this discrepancy (i.e. limit reproductive potential)?
11) a) What is the formula that is used to determine “population growth” or “population change”?

b) A population of 2000 seals produces 950 young in one year. In the same period of time, 150 seals die. If 50 seals leave the population to join another population, and 30 seals join the population under study, what is the “population change” of the population under study?

c) What is an “open population”?

d) What is a closed population?

e) Which type of a population (i.e., open versus closed) is the most common? What are some examples of closed populations?

f) What is meant by the term “biotic potential”?
12) a) What is a density dependent factor?

b) List THREE different density dependent factors.

13) a) Distinguish between intraspecific competition and interspecific competition.

b) What are some of the potential consequences to the population as the density of that population increases?
14) a) What is predation?

b) How does predation operate as a density dependent factor?

c) How does disease operate as a density dependent factor?

d) What is the “Allee effect”?

e) What is meant by the term “minimum viable population size”?
15) a) What is a density independent factor?

b) What are TWO (supposedly) examples of density independent factors? Provide specific examples.

c) What is meant by the term “biomagnification”?

d) Why are top level carnivores so susceptible to such things as pesticide use?

e) What is a “limiting factor”?

f) What typically happens when a population surpasses the carrying capacity of the environment?

g) Why do population biologists monitor natural fluctuations in such things as the size and density of populations?